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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/724,791	12/01/2003	Michael B. Korzenski	020732-100.686	1912

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EXAMINER	
UMEZ ERONINI, LYNETTE T	

ART UNIT	PAPER NUMBER
1765	

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07/13/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/724,791	KORZENSKI ET AL.	
	Examiner	Art Unit	
	Lynette T. Umez-Eronini	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 May 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-7,9,11-14 and 39-42* is/are pending in the application.

4a) Of the above claim(s) *43* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4-7,9,11-14 and 39-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12/1/2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I claims 1, 4-7, 9, 11-14, and 42 (product claims that are drawn to an etching composition) in the reply filed on 5/3/2007 is acknowledged. The traversal is on the ground(s) that the restriction requirement be reconsidered and that claim 43 (which is drawn to a method of producing micro electro mechanical systems (mems)) be retained in consolidation form for further examination and prosecution on the merits. This is not found persuasive because the product can be used in a materially different process of using that product such as cleaning photoresist residues.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1, 4, 5, 7, 9, 14, and 39-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seghal (US 2004/0050406 A1).

Seghal teaches a composition for removing photoresist and or resist residues from a semiconductor substrate. The composition includes supercritical CO_2 and co-solvents [0023], which includes alcohols [0029]. Various other ingredients may be blended into the co-solvent mixture, which includes surfactants. Seghal teaches the surfactant may be non-ionic [0060]. Seghal further teaches an accelerator such as carboxylic acids such and solvents such as lower alcohols (methanol, ethanol) [0046]. Seghal also teaches an aqueous fluoride such as ammonium bifluoride may be added to the co-solvent mixture [0048]. Since Seghgal's composition comprises the same chemical components as claimed by Applicants, then using Seghal's composition in the same manner as claimed by Applicants would read on and result the same wherein,

A sacrificial silicon-containing layer etching composition, comprising a supercritical fluid (SCF), at least one co-solvent, at least one etchant species, at least one non-ionic surfactant, wherein the etchant species comprises at least one bifluoride compound selected from the group consisting of ammonium bifluoride and tetraalkylammonium bifluoride R_4NHF_2 and optionally at least one surfactant, **in claim 1**;

wherein the sacrificial silicon-containing layer comprises a silicon-containing species selected from the group consisting of silicon oxide and silicon nitride, **in claim 7**; and

wherein the sacrificial silicon-containing layer consists essentially of silicon, **in claim 14**.

Seghal also teaches,

wherein the co-solvent comprises at least one C_1-C_2 alcohol [0026 and 0046], **in claim 4**;

wherein the co-solvent comprises methanol [0026 and 0046], **in claim 5**;

wherein the etchant species comprises ammonium bifluoride [0048], **in claim 9**; and

wherein the SCF is selected from the group consisting of carbon dioxide, oxygen, argon, krypton, xenon, and ammonia [0025], **in claim 41**; and

wherein the SCF is carbon dioxide [0023], **in claim 42**.

As to claims 1, 39 and 40, Sehgal teaches all of the limitations as in re claim 1.

Sehgal differs in failing to teach the composition "consisting essentially of" or "consisting of" Applicants' specifically claimed supercritical fluid, at least one co-solvent, and at least one bifluoride compound, as recited in the claims.

However, Sehgal illustrates the combination of a supercritical fluid and at least one co-solvent, and an aqueous fluoride, which includes ammonium bifluoride may be added to the co-solvent mixture [0048] or other ingredients in supercritical form may be used alone or in combination with each other or with superciritical CO_2 [0025]. Hence, it

would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Sehgal by using any combination of components, including Applicants' specifically claimed composition because such components are known to effect the disclosed composition in processing semiconductor substrate since Applicants have failed to provide evidence as to what is actually excluded by "consisting essentially of."

5. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sehgal (US '406 A1) as applied to claim 1 above, in view of Mullee (US 6,306,564 B1).

Sehgal differs in failing to teach wherein the co-solvent comprises isopropanol.

Mullee teaches a stripping chemical comprising: supercritical CO_2, and one or more chemicals such as ammonium bifluoride in removing resist, residue, or other contaminants on a wafer (column 3, line 67 – column 4, line 39). Mullee also teaches other chemicals such as an organic solvent that includes for example, an alcohol, methanol, ethanol, or isopropanol, which may be used independently or added to remove organic contaminants from a wafer surface (column 4, lines 21-28).

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Sehgal's composition by employing alcohols as taught by Mullee for the purpose of removing organic contaminants from the wafer surface (Mullee, column 4, lines 21-24).

6. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sehgal (US '406 A1) as applied to claim 1 above, and further in view of Wilkinson et al. (US 5,789,505).

Sehgal differs in failing to teach wherein the nonionic surfactant is selected from the group consisting of fluoroalkyl surfactants, polyethylene glycols, polypropylene glycols, polyethylene ethers, polypropylene glycol ethers, carboxylic acid salts, dodecylbenzenesulfonic acid, dodecylbenzenesulfonic salts, polyacrylate polymers, dinonylphenyl polyoxyethylene, silicone polymers, modified silicone polymers, acetylenic diols, modified acetylenic diols, alkylammonium salts, modified alkylammonium salts, and combinations comprising at least one of the foregoing, **in claim 11**; and

wherein the nonionic surfactant comprises a modified acetylenic diol, **in claim 12**.

Wilkinson teaches acetylenic alcohols and diols have been utilized as non-ionic surfactants in cleaning applications (column 3, lines 18-21) and are contemplated to have utility in environmentally friendly cleaning operations (column 4, line 30-32 and column 5, lines 44-46), Wilkinson also teaches 0.01 to 30 wt % acetylene diol in CO_2 (column 4, lines 61-63). Hence, one can conclude the balance of CO_2 ranges from 99.09 to 70 wt %.

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Sehgal's composition by employing a surfactant as taught by Wilkinson for the purpose of using a material that in environmentally friendly.

Sehgal in view Wilkinson differ in failing to teach wherein the etching composition comprises about 75.0 wt % to about 99.5 wt % SCF, about 0.3 wt % to about 22.5 wt % co-solvent, about 0.01 wt % to about 5.0 wt % etchant species,, based on the total weight of the composition, **in claim 13**.

However, Sehgal in view Wilkinson illustrates the specific combination of a supercritical fluid, co-solvent, an etchant (bifluoride compound) species, and one surfactant in a composition is known. Hence, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select any proportion of wt % of components in the combined references of Sehgal and Wilkinson because the wt % is considered a result effective variable, which would have been optimized by routine experimentation for the purpose of obtaining the disclosed composition.

Response to Arguments

7. Applicants' arguments, see Remarks, filed 5/3/2007, with respect to the rejection(s) of claim(s) 1-7, 9, 11, 12, 14, under 35 U.S.C. §102(e) as being anticipated over Seghal (US 2004/0050406) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new rejection is made in view of Sehgal (US 2004/0050406 A1) over claims 1, 4, 5, 7, 9, 14 to address "an etching composition --consisting essentially of-- . . ." chemical as recited in (Currently Amended) Claim 1; and "an etching composition consisting essentially of . . . --at least one non ionic surfactant, wherein the at least one bifluoride

compound comprises a species-- selected from . . .", as recited in (Currently Amended Claim) 39.

8. Applicant's arguments filed 5/3/2007 have been fully considered but they are not persuasive. Applicants traverse the 103 (a) rejection of claims 39 and 40 over Seghal as failing to teach Applicants' specifically claimed etching composition. Applicants argue the Seghal reference is related to the removal of photoresist and/or resist residue and discloses a "co-solvent 1" mixture, which includes one or more organic solvent and may further include any one of an oxidizer, buffering agents, corrosion inhibitors, chelating agents, surfactants, accelerators, or aqueous fluorides. Applicants listed seven embodiments of compositions as disclosed by Seghal. Applicants argue one skilled in the art would have no direction as to which embodiment to select to remove sacrificial silicon -containing material.

Applicants' arguments are acknowledged and unpersuasive because Seghal teaches a composition that includes supercritical CO_2 and co-solvents [0023], which include alcohols [0029] and various other ingredients may be blended into the co-solvent mixture, which includes surfactants. Seghal teaches the surfactant may be non-ionic [0060]. Seghal further teaches an accelerator such as carboxylic acids such and solvents such as lower alcohols (methanol, ethanol) [0046]. Seghal also teaches an aqueous fluoride such as ammonium bifluoride may be added to the co-solvent mixture [0048]. Since Seghal illustrates the combination of a supercritical fluid and at least one co-solvent, and an aqueous fluoride, which includes ammonium bifluoride may be added to the co-solvent mixture [0048] or other ingredients in supercritical form may be

used alone or in combination with each other or with supercritical CO_2 [0025]. Hence, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Seghal by using any combination of components, including Applicants' specifically claimed composition because such components are known to effect the disclosed composition in processing semiconductor substrate since Applicants have failed to provide evidence as to what is actually excluded by "consisting essentially of."

Applicants traverse the rejection of claim 6 under 35 U.S.C. 103(a) over Seghal (US '406) as applied to claim 1, in view of Mullee (US 6,306,564). Applicants' argue Mullee's laundry list of chemical compound that may be added to supercritical CO_2 composition fails to cure Seghal's deficiency of teaching isopropanol (co-solvent).

Applicants' arguments are acknowledged and unpersuasive because Mullee teaches a stripping chemical that comprises: supercritical CO_2, and one or more chemicals such as ammonium bifluoride in removing resist, residue, or other contaminants on a wafer (column 3, line 67 – column 4, line 39). Mullee also teaches other chemicals such as an organic solvent that includes for example, an alcohol, methanol, ethanol, or isopropanol, which may be used independently or added to remove organic contaminants from a wafer surface (column 4, lines 21-28). Since Mullee illustrates a stripping (or etching) solution comprising isopropanol is known, then it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Seghal's composition by employing alcohols as taught by

Mullee for the purpose of removing organic contaminants from the wafer surface (Mullee, column 4, lines 21-24).

Applicants traverse the rejection of claims 11-13 under 35 U.S.C. 103(a) over Seghal (US '406) as applied to claim 1, in view of Wilkinson et al. (US 5,789,505). Applicants argue Wilkinson's family of surfactants fails to cure Seghal's deficiency and does not make obvious Applicants' claimed invention consisting essentially of at least one co-solvent and at least on bifluoride species.

Applicants' arguments are acknowledged and unpersuasive because Seghal's deficiency is cure by Wilkinson, which teaches acetylenic alcohols and diols have been utilized as non-ionic surfactants in cleaning applications (column 3, lines 18-21) and are contemplated to have utility in environmentally friendly cleaning operations (column 4, line 30-32 and column 5, lines 44-46), Hence, it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Seghal's composition by employing a surfactant as taught by Wilkinson for the purpose of using a material that in environmentally friendly.

Further the combination of Seghal in view Wilkinson illustrates the specific combination of a supercritical fluid, co-solvent, an etchant (bifluoride compound) species, and one surfactant in a composition is known. Hence, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Seghal by using selecting any combination of components in the Wilkinson reference, including Applicants' specifically claimed composition because such components are known to effect the disclosed composition in processing semiconductor

substrate since Applicants have failed to provide evidence as to what is actually excluded by "consisting essentially of."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 571-272-1470. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Art Unit 1765

ltue

July 9, 2007

NADINE NORTON
SUPERVISORY PATENT EXAMINER